

Appl. No. 10/644,523

Amdt. Dated May 30, 2006

Reply to Office Action of February 28, 2006

REMARKS

This is a full and timely response to the non-final Office action mailed February 28, 2006. Reexamination and reconsideration in view of the foregoing amendments and following remarks is respectfully solicited.

Claims 1- 48 are pending in this application, and Claims 1-48 are rejected. Claims 1, 13, 16, 17, 19, 20, 22, 27, 36, and 41 have been amended, and Claims 23, 28, and 42 have been canceled. No new matter is believed to have been added.

Rejections Under 35 U.S.C. § 102

Examiner has rejected claims 1-2, 7-12, 16-18, 20-24, 27-30, and 33-40 under 35 U.S.C. § 102 (b) as being anticipated by Iyer et al. (U.S. Patent No. 6,121,133). Examiner states that Iyer teaches forming and oxidation diffusion barrier stack on an integrated circuit, and that the oxidation diffusion layers comprise various stacks of layers of material. Examiner states that the stacks include an antireflective layer (isolation barrier) comprising silicon-rich silicon oxide, nitride, or oxynitride while the diffusion barrier layers comprise silicon nitride (oxygen barrier) or silicon oxynitride.

Silica based components such as blades, nozzles, and combustors which are found in the hot section of gas turbine engines, are prone to excessive oxidation and the subsequent rapid loss of the resulting silica layer. The combination of excessive oxidation of these components and the loss of resulting silica layer leads to recession of the components, reduced load-bearing capability, and a shortened lifetime.

In contrast, the Iyer et al. reference (133) relates to the problems experienced with conventional optical photolithography in that it is difficult to obtain uniform exposure of photoresist underlying transparent portions of a mask. That is, oftentimes light that penetrates the photoresist is reflected back towards the light source from the surface of the underlying layers of the substrate assembly. To help resolve this problem, antireflective coatings including inorganic reflective layers have been utilized between the underlying layers of a substrate assembly so as to minimize photo resist exposure from surface reflections.

In order to clearly distinguish Applicants' invention from that which is shown and described in the Iyers et al. reference, Applicants have amended their claims as follows:

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Applicants' independent Claim 1 has been amended to recite that the second isolation layer comprises a material selected from the group consisting of Ta_2O_5 , Ta_5Si_3 , $TaSi_2$, $MoSi_2$, and Mo_5Si_3 . The materials Si_3N_4 , Si_2N_2O , and SiC have been deleted from the claim. It is respectively submitted that the use of the materials, now remaining in amended Claim 1, as an isolation layer is not shown or described in the Iyer's et al. reference. Therefore, it is respectively submitted that Applicants' amended independent Claim 1 is allowable. Dependent Claims 2-12 are believed to properly depend, either directly or indirectly, from Applicants' amended independent Claim 1 and are believed allowable therewith.

Applicant wishes to particularly note that Claim 10 recites a first isolation layer that consists essentially of silicon nitride, and second isolation layer that consists essentially of Ta_2O_5 , and the first oxygen barrier layer is formed *in situ* by reaction of the silicon nitride with the Ta_2O_5 . This is neither shown nor suggested in the Iyer's et al. reference.

Applicants' independent Claim 13 has been amended to recite that the second isolation layer consists essentially of Ta_2O_5 . As stated previously, this is not shown or suggested in Iyer's et al. Therefore, it is respectively submitted that Applicants' amended Claim 13 is allowable. Dependent Claims 14 and 15 are believed to properly depend, either directly or indirectly, from Applicants' amended Claim 13 and are believed allowable therewith.

Applicants' independent Claim 16 has been amended to remove Si_3N_4 , Si_2N_2O , and SiC from Claim 16. The materials still recited in Claim 16 are neither disclosed nor suggested by the Iyer's et al. reference. Therefore, it is respectively submitted that Applicants' amended independent Claim 16 is allowable.

Applicants' independent Claim 17 has been amended to recite that at least one of the plurality of isolation layers consist essentially of Ta_2O_5 . This is not taught or suggested in the Iyer's of et al. reference. Therefore, it is respectively submitted that Applicants' amended Claim 17 is allowable. Claim 18 is believed to properly depend from Applicants' amended Claim 17 and is believed allowable therewith.

Applicants' independent Claim 19 has been amended to recite a gas turbine engine element including a silicon-based substrate. It is respectively submitted that the Iyer's et al. reference does not teach or suggest a diffusion barrier in a gas turbine engine element including a silicon-based substrate. Therefore, it is respectively submitted that Applicants' independent

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Claim 19 is allowable.

Applicants' independent Claim 20 has been amended to remove the recitation of Si_3N_4 , $\text{Si}_2\text{N}_2\text{O}$, and SiC as a material that may be used as the second isolation layer. The remaining materials are neither taught nor suggested by the Iyer's et al. reference. Therefore, it is respectively submitted that Applicants' independent Claim 20 is allowable. Dependent Claim 21 is believed to properly depend from Applicants' amended independent Claim 20 and is believed allowable therewith.

Applicants' independent Claim 22 has been amended to now recite that the isolation layer consists of Ta_2O_5 , Ta_5Si_3 , TaSi_2 , MoSi_2 , and Mo_5Si_3 . Since Iyer's et al. does not teach an isolation layer consisting of these materials, it is respectively submitted that Applicants' amended Claim 22 is allowable. Dependent Claim 24-26 are believed to properly depend, either directly or indirectly, from Applicants' amended independent Claim 22 and are believed allowable therewith. Claim 23 has been canceled.

Applicants' independent Claim 27 has been amended to recite the forming of a first isolation layer selected from the group consisting of Ta_2O_5 , Ta_5Si_3 , TaSi_2 , MoSi_2 , and Mo_5Si_3 on a silicon-based substrate. This step for making a component is not shown or suggested in the Iyer's et al. reference. Therefore, it is respectively submitted that Applicants amended independent claim 27 is allowable. Dependent claims 29-35 are believed to properly depend, either directly or indirectly, from Applicants' amended independent Claim 27 and are believed allowable therewith. Dependent Claim 28 has been canceled.

Applicants' independent Claim 36 has been amended to delete the recitation of the materials Si_3N_4 , $\text{Si}_2\text{N}_2\text{O}$, and SiC as materials for the second isolation layer. The remaining materials are not shown or described in Iyer's et al. reference as previously described. Therefore, it is respectively submitted that Applicants' amended independent Claim 36 is allowable. Dependent Claim 37 is believed to properly depend, either directly or indirectly, from Applicants' amended independent Claim 36 is believed allowable therewith.

Applicants' independent Claim 38 specifically recites that the first isolation layer consists essentially of Si_3N_4 and the second isolation layer consists essentially Ta_2O_5 . The use of Ta_2O_5 as an isolation layer is not shown or suggested in Iyers et al. reference. Therefore, it is respectively submitted that Applicants' amended independent Claim 38 is allowable. Claims 39

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and 40 are believed to properly depend, either directly or indirectly, from Applicants' and are allowable therewith.

Rejections Under 35 U.S.C. § 103

Examiner rejects claims 3-6, 13-15, 19, 25-26, 31-32, 36, 42, 45-46 under 35 U.S.C. § 103(a) as being unpatentable over Iyers in view of Lucovsky (U.S. Patent No. 6,552,403 B1) further in view of Barrow et al (U.S. Patent No. 5,585,136). Examiner states that while Iyers et al. is silent with regard to an environmental barrier coating, Lucovsky teaches the use of an insulating layer comprising ALTiO₃. Examiner further states that Barrows teaches a thermal barrier coating or dielectric coating deposited using a sol gel method and comprising yttria stabilized zirconia. Neither Lucovsky reference nor the Barrow reference supplies the deficiencies pointed out above with respect to Iyers et al. For example, they do not teach the use of Ta₂O₅, Ta₅Si₃, TaSi₂, MoSi₂, and Mo₅Si₃ as isolation layers. Thus, these claims and the claims which depend therefrom are believed allowable as previously discussed.

Claims 42, 45, and 46 depend, either directly or indirectly, from Applicants' independent Claim 41. While the PTOL-326 (Rev. 7-05) indicates that Claim 41 has been rejected, nowhere does Examiner express the details of the rejection of Claim 41. Nevertheless, Applicants' independent Claim 41 has been amended to recite that the isolation layer comprises of material selected from the group consisting of Ta₂O₅, Ta₅Si₃, TaSi₂, MoSi₂, and Mo₅Si₃. Therefore it is respectfully submitted, that applicant's amended independent Claim 41 distinguishes over the Iyers et al., Lucovsky, and Barrow references taken singly or in combination and is therefore allowable. Claims 42, 45, 46 are believed properly depend, either directly or indirectly, from Applicants' amended independent Claim 41 and are believed allowable therewith.

Examiner rejects claims 2, 35, 37, 41, 43-44, and 47-48 under 35 U.S.C. § 103(a) as being unpatentable over Iyers. Examiner states that the Iyers et al. reference envisions additional layers including any material known to prevent diffusion of oxygen in addition to or in place of stacks of layers depending upon the application. Examiner concludes that it would be obvious to one of ordinary skill in the art at the time of the invention to add additional layer to optimize the diffusion barrier to a specific application. As stated previously, Claims 2, 35, 37, 41, 43-44, and 47-48 are believed properly depend, either directly or indirectly, from independent claims which

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have been amended and are now believed to distinguish over and be fully unobvious in view of the cited references. It is therefore it is respectfully submitted that these claims are allowable.

Conclusion

Based on the above, it is respectfully submitted that the independent claims now present in the application are patentable over the citations of record. The dependent claims are also deemed patentable for the reasons given above with respect to the independent claims and because each recite features which are patentable in its own right. Individual consideration of the dependent claims is respectfully solicited.

The other art of record is also not understood to disclose or suggest the inventive concept of the present invention as defined by the claims.

Hence, Applicants' submit that the present application is in condition for allowance. Favorable reconsideration and withdrawal of the objections and rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

If the Examiner has any comments or suggestions that could place this application in even better form, the Examiner is requested to telephone the undersigned attorney at the below-listed number.

If for some reason Applicant has not paid a sufficient fee for this response, please consider this as authorization to charge Ingrassia, Fisher & Lorenz, Deposit Account No. 50-2091 for any fee which may be due.

Respectfully submitted,

INGRASSIA FISHER & LORENZ

Dated: 5/30/06

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